Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S134	27	"715"/$.ccls. and (texture and widget$)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2006/02/09 15:41
S133	445	"715"/$.ccls. and ((GUI or "graphical user interface") and widget$)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2006/02/09 13:54
S132	3	345/582.ccls. and ((GUI or "graphical user interface") and widget$)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2006/02/09 13:52
S129	19	345/582.ccls. and ((GUI or "graphical user interface") and (map$4 same matrix))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2006/02/09 13:52
S131	21	715/964.ccls. and (snap$3 or gravity)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2006/02/09 11:02
S130	12	(345/420.ccls. or 345/424.ccls.) and ((GUI or "graphical user interface") and (texture same (translat$3 or scal$3 or rotat$3 or spinn$3)))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2006/02/09 11:02
S128	50	(S121 or S122 or S123 or S124 or S125 or S126) and (texture and (translat$3 or scal$3 or rotat$3 or spinn$3))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2006/02/09 11:01
S98	20	715/964.ccls. and (snap$3 or gravity)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2006/02/09 10:26
S127	14	(S121 or S122 or S123 or S124 or S125 or S126) and (texture same (translat$3 or scal$3 or rotat$3 or spinn$3))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2006/02/09 10:25
S97	10	(345/420.ccls. or 345/424.ccls.) and ((GUI or "graphical user interface") and (texture same (translat$3 or scal$3 or rotat$3 or spinn$3)))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2006/02/09 10:25

S96	15	345/582.ccls. and ((GUI or "graphical user interface") and (map$4 same matrix))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2006/02/09 10:25
S126	47	715/801.ccls.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2006/02/09 10:22
S125	147	715/800.ccls.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2006/02/09 10:22
S124	86	715/798.ccls.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2006/02/09 10:22
S123	367	715/788.ccls.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2006/02/09 10:22
S122	1005	715/764.ccls.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2006/02/09 10:22
S121	294	715/763.ccls.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2006/02/09 10:22
S119	47	715/801.ccls.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2006/02/09 10:22
S95	14	(S88 or S89 or S90 or S91 or S92 or S93) and (texture same (translat$3 or scal$3 or rotat$3 or spinn$3))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2006/02/09 10:22
S120	86	715/798.ccls.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2006/02/09 10:21

S118	33	715/723.ccls. and (texture and (translat$3 or scal$3 or rotat$3 or spinn$3))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2006/02/09 10:21
S87	77	715/798.ccls.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2006/02/09 10:21
S86	42	715/801.ccls.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2006/02/09 10:21
S117	47	715/723.ccls. and (texture)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2006/02/09 10:15
S116	26	715/725.ccls.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2006/02/09 10:15
S115	59	715/726.ccls.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2006/02/09 10:15
S114	28	715/724.ccls.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2006/02/09 10:15
S85	28	715/723.ccls. and (texture and (translat$3 or scal$3 or rotat$3 or spinn$3))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2006/02/09 10:15
S84	41	715/723.ccls. and (texture)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2006/02/09 10:15
S83	47	715/726.ccls.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2006/02/09 10:15

S82	21	715/725.ccls.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2006/02/09 10:15
S79	21	715/724.ccls.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2006/02/09 10:15
S113	46	715/701.ccls. and texture	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2006/02/09 10:11
S78	42	715/701.ccls. and texture	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2006/02/09 10:11
S112	93	715/701.ccls.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2006/02/09 10:08
S111	20	715/700.ccls. and (texture and (((adjust$4 or modif$5 chang$3) same (translat$3 or scal$3 or rotat$3 or spinn$3))))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2006/02/09 10:08
S110	4	715/700.ccls. and (texture same (((adjust$4 or modif$5 chang$3) same (translat$3 or scal$3 or rotat$3 or spinn$3))))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2006/02/09 10:08
S77	83	715/701.ccls.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2006/02/09 10:08
S76	19	715/700.ccls. and (texture and (((adjust$4 or modif$5 chang$3) same (translat$3 or scal$3 or rotat$3 or spinn$3))))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2006/02/09 10:08
S75	4	715/700.ccls. and (texture same (((adjust$4 or modif$5 chang$3) same (translat$3 or scal$3 or rotat$3 or spinn$3))))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2006/02/09 10:08

S109	1	715/700.ccls. and (texture same tile$1) and ((adjust$4 or modif$5 chang$3) same (translat$3 or scal$3 or rotat$3 or spinn$3))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2006/02/09 10:07
S108	40	345/588.ccls.	US-PGPUB; USPAT; DERWENT	OR	OFF	2006/02/09 10:07
S74	1	715/700.ccls. and (texture same tile$1) and ((adjust$4 or modif$5 chang$3) same (translat$3 or scal$3 or rotat$3 or spinn$3))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2006/02/09 10:07
S72	37	345/588.ccls.	US-PGPUB; USPAT; DERWENT	OR	OFF	2006/02/09 10:07
S107	25	345/582.ccls. and ((GUI or "graphical user interface") and ((adjust$4 or modif$5 chang$3) same (translat$3 or scal$3 or rotat$3 or spinn$3)))	US-PGPUB; USPAT; DERWENT	OR	OFF	2006/02/09 10:06
S106	9	345/582.ccls. and ((GUI or "graphical user interface") same ((adjust$4 or modif$5 chang$3)))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2006/02/09 10:06
S71	18	345/582.ccls. and ((GUI or "graphical user interface") and ((adjust$4 or modif$5 chang$3) same (translat$3 or scal$3 or rotat$3 or spinn$3)))	US-PGPUB; USPAT; DERWENT	OR	OFF	2006/02/09 10:06
S21	5	345/582.ccls. and ((GUI or "graphical user interface") same ((adjust$4 or modif$5 chang$3)))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2006/02/09 10:06
S105	5	345/582.ccls. and ((GUI or "graphical user interface") same ((adjust$4 or modif$5 chang$3) same texture))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2006/02/09 10:05
S104	4	345/582.ccls. and ((GUI or "graphical user interface") same ((adjust$4 or modif$5 chang$3) near5 texture))	US-PGPUB; USPAT; DERWENT	OR	OFF	2006/02/09 10:05
S68	4	345/582.ccls. and ((GUI or "graphical user interface") same ((adjust$4 or modif$5 chang$3) near5 texture))	US-PGPUB; USPAT; DERWENT	OR	OFF	2006/02/09 10:05

S20	2	345/582.ccls. and ((GUI or "graphical user interface") same ((adjust$4 or modif$5 chang$3) same texture))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2006/02/09 10:05
S103	32	(haptic adj3 device) and (texture same (GUI or "graphical user interface"))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2006/02/09 07:53
S102	4	berger-torsten.in.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2006/02/09 07:52
S66	30	(haptic adj3 device) and (texture same (GUI or "graphical user interface"))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2006/02/09 07:52
S64	4	berger-torsten.in.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2006/02/09 07:52
S1	1	berger-torsten.in.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2006/02/08 12:59
S99	17	haptic near3 detent	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2005/07/19 14:18
S51	20	715/964.ccls. and (snap$3 or gravity)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2005/07/14 12:06
S47	7	(345/420.ccls. or 345/424.ccls.) and ((GUI or "graphical user interface") and (texture same (translat$3 or scal$3 or rotat$3 or spinn$3)))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2005/07/14 12:04
S94	68	(S88 or S89 or S90 or S91 or S92 or S93) and (texture)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2005/07/14 11:55

S46	12	345/582.ccls. and ((GUI or "graphical user interface") and (map$4 same matrix))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2005/07/14 11:55
S93	42	715/801.ccls.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2005/07/14 11:54
S92	124	715/800.ccls.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2005/07/14 11:54
S91	77	715/798.ccls.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2005/07/14 11:54
S90	330	715/788.ccls.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2005/07/14 11:54
S89	902	715/764.ccls.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2005/07/14 11:54
S88	268	715/763.ccls.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2005/07/14 11:54
S45	13	(S37 or S38 or S39 or S40 or S41 or S42) and (texture same (translat$3 or scal$3 or rotat$3 or spinn$3))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2005/07/14 11:54
S44	62	(S37 or S38 or S39 or S40 or S41 or S42) and (texture)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2005/07/14 11:54
S42	31	715/801.ccls.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2005/07/14 10:30

S40	67	715/798.ccls.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2005/07/14 10:30
S81	520	715/723.ccls.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2005/07/14 09:56
S35	25	S30 and (texture and (translat$3 or scal$3 or rotat$3 or spinn$3))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2005/07/14 09:56
S34	38	S30 and (texture)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2005/07/14 09:56
S33	40	715/726.ccls.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2005/07/14 09:56
S32	17	715/725.ccls.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2005/07/14 09:56
S30	485	715/723.ccls.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2005/07/14 09:56
S31	14	715/724.ccls.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2005/07/14 09:55
S73	719	715/700.ccls.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2005/07/14 09:21
S29	18	715/700.ccls. and (texture and (((adjust$4 or modif$5 chang$3) same (translat$3 or scal$3 or rotat$3 or spinn$3))))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2005/07/14 09:21

S28	4	715/700.ccls. and (texture same (((adjust$4 or modif$5 chang$3) same (translat$3 or scal$3 or rotat$3 or spinn$3))))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2005/07/14 09:21
S27	1	715/700.ccls. and (texture same tile$1) and ((adjust$4 or modif$5 chang$3) same (translat$3 or scal$3 or rotat$3 or spinn$3))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2005/07/14 09:21
S26	663	715/700.ccls.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2005/07/14 09:21
S13	36	345/588.ccls.	US-PGPUB; USPAT; DERWENT	OR	OFF	2005/07/14 09:20
S12	12	345/582.ccls. and ((GUI or "graphical user interface") and ((adjust$4 or modif$5 chang$3) same (translat$3 or scal$3 or rotat$3 or spinn$3)))	US-PGPUB; USPAT; DERWENT	OR	OFF	2005/07/14 09:14
S70	9	345/582.ccls. and ((GUI or "graphical user interface") same ((adjust$4 or modif$5 chang$3)))	US-PGPUB; USPAT; DERWENT	OR	OFF	2005/07/14 09:12
S69	5	345/582.ccls. and ((GUI or "graphical user interface") same ((adjust$4 or modif$5 chang$3) same texture))	US-PGPUB; USPAT; DERWENT	OR	OFF	2005/07/14 09:12
S9	5	345/582.ccls. and ((GUI or "graphical user interface") same ((adjust$4 or modif$5 chang$3)))	US-PGPUB; USPAT; DERWENT	OR	OFF	2005/07/14 09:12
S8	2	345/582.ccls. and ((GUI or "graphical user interface") same ((adjust$4 or modif$5 chang$3) same texture))	US-PGPUB; USPAT; DERWENT	OR	OFF	2005/07/14 09:12
S67	727	345/582.ccls.	US-PGPUB; USPAT; DERWENT	OR	OFF	2005/07/14 09:11
S7	1	345/582.ccls. and ((GUI or "graphical user interface") same ((adjust$4 or modif$5 chang$3) near5 texture))	US-PGPUB; USPAT; DERWENT	OR	OFF	2005/07/14 09:11
S6	676	345/582.ccls.	US-PGPUB; USPAT; DERWENT	OR	OFF	2005/07/14 09:11
S3	26	(haptic adj3 device) and (texture same (GUI or "graphical user interface"))	US-PGPUB; USPAT; DERWENT	OR	OFF	2005/07/14 09:10

S63	0	S48 and detent	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2005/02/23 15:45
S62	12	345/427.ccls. and ((matrix or matrices) near7 (modifi$4))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2005/02/23 15:45
S60	1	345/427.ccls. and ((matrix or matrices) near7 (modifi$4)) same texture	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2005/02/23 13:26
S61	2	345/427.ccls. and ((matrix or matrices) near7 (adjust$4 or chang$3)) same texture	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2005/02/23 13:24
S59	242	345/427.ccls. and (matrix or matrices)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2005/02/23 13:23
S56	70	((matrix or matrices) near7 (modifi$4)) same texture	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2005/02/23 13:23
S55	14	"345"/$.ccls. and ((matrix or matrices) near7 (chang$3 or adjust$4 or modifi$4)) same texture	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2005/02/23 13:21
S54	1190	"345"/$.ccls. and (matrix or matrices) near7 (chang$3 or adjust$4 or modifi$4)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2005/02/23 12:45
S53	19	345/582.ccls. and (matrix or matrices) near7 (chang$3 or adjust$4 or modifi$4)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2005/02/23 12:45
S52	0	S48 and (matrix or matrices) near7 (chang$3 or adjust$4 or modifi$4)	US-PGPUB; USPAT	OR	OFF	2005/02/23 11:34

S48	9	(US-20020018065-$ or US-20020154132-$ or US-20030068098-$).did. or (US-6188403-$ or US-6204851-$ or US-6285381-$ or US-6664972-$ or US-6707458-$ or US-6765572-$). did.	US-PGPUB; USPAT	OR	OFF	2005/02/23 11:33
S50	1	S48 and (snap or gravity)	US-PGPUB; USPAT; DERWENT	OR	OFF	2005/02/23 11:08
S49	2	S48 and emboss$3	US-PGPUB; USPAT; DERWENT	OR	OFF	2005/02/23 09:46
S43	140	715/964.ccls.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2005/02/18 13:23
S41	105	715/800.ccls.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2005/02/18 13:23
S39	293	715/788.ccls.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2005/02/18 13:23
S38	836	715/764.ccls.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2005/02/18 13:23
S37	244	715/763.ccls.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2005/02/18 13:23
S25	36	345/588.ccls.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2005/02/18 10:58
S23	7	345/582.ccls. and ((GUI or "graphical user interface") and ((adjust$4 or modif$5 chang$3) same (translat$3 or scal$3 or rotat$3 or spinn$3))) and tile$1	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2005/02/18 10:50

S22	12	345/582.ccls. and ((GUI or "graphical user interface") and ((adjust$4 or modif$5 chang$3) same (translat$3 or scal$3 or rotat$3 or spinn$3)))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2005/02/18 10:50
S14	7	345/582.ccls. and ((GUI or "graphical user interface") and ((adjust$4 or modif$5 chang$3) same (translat$3 or scal$3 or rotat$3 or spinn$3))) and tile$1	US-PGPUB; USPAT; DERWENT	OR	OFF	2005/02/18 10:50
S19	1	345/582.ccls. and ((GUI or "graphical user interface") same ((adjust$4 or modif$5 chang$3) near5 texture))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2005/02/18 10:49
S18	14	S17 not S16	US-PGPUB; USPAT; DERWENT	OR	OFF	2005/02/18 10:49
S5	14	S4 not S3	US-PGPUB; USPAT; DERWENT	OR	OFF	2005/02/18 10:49
S17	30	(haptic adj3 device) and (texture and ((GUI or "graphical user interface") same (translat$3 or scal$3 or rotat$3 or spinn$3)))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2005/02/18 10:48
S16	26	(haptic adj3 device) and (texture same (GUI or "graphical user interface"))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2005/02/18 10:48
S15	7	345/582.ccls. and ((GUI or "graphical user interface") and ((adjust$4 or modif$5 chang$3) same (translat$3 or scal$3 or rotat$3 or spinn$3))) and tile$1	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2005/02/18 10:48
S4	30	(haptic adj3 device) and (texture and ((GUI or "graphical user interface") same (translat$3 or scal$3 or rotat$3 or spinn$3)))	US-PGPUB; USPAT; DERWENT	OR	OFF	2005/02/18 10:48

Terms used **haptic texture GUI rotate 3D three dimension three dimension**

Found **39** of **907,880**

1 Level set and PDE methods for computer graphics

David Breen, Ron Fedkiw, Ken Museth, Stanley Osher, Guillermo Sapiro, Ross Whitaker

August 2004 **Proceedings of the conference on SIGGRAPH 2004 course notes GRAPH '04**

Publisher: ACM Press

Full text available: pdf(17.07 MB) Additional Information: full citation, abstract

Level set methods, an important class of partial differential equation (PDE) methods, define dynamic surfaces implicitly as the level set (iso-surface) of a sampled, evolving nD function. The course begins with preparatory material that introduces the concept of using partial differential equations to solve problems in computer graphics, geometric modeling and computer vision. This will include the structure and behavior of several different types of differential equations, e.g. the level set eq ...

2 The design of 3D haptic widgets

Timothy Miller, Robert Zeleznik

April 1999 **Proceedings of the 1999 symposium on Interactive 3D graphics**

Publisher: ACM Press

Full text available: pdf(852.35 KB) Additional Information: full citation, references, citings, index terms

Keywords: 3D haptic widgets, 3D widgets, widget taxonomy

3 Seeing, hearing, and touching: putting it all together

Brian Fisher, Sidney Fels, Karon MacLean, Tamara Munzner, Ronald Rensink

August 2004 **Proceedings of the conference on SIGGRAPH 2004 course notes GRAPH '04**

Publisher: ACM Press

Full text available: pdf(20.64 MB) Additional Information: full citation

4 Two-handed virtual manipulation

Ken Hinckley, Randy Pausch, Dennis Proffitt, Neal F. Kassell

September 1998 **ACM Transactions on Computer-Human Interaction (TOCHI)**, Volume 5 Issue 3

Publisher: ACM Press

Full text available: pdf(1.32 MB) Additional Information: full citation, abstract, references, citings, index terms

We discuss a two-handed user interface designed to support three-dimesional neurosurgical visualization. By itself, this system is a "point design," an example of an advanced user interface technique. In this work, we argue that in order to understand

why interaction techniques do or do not work, and to suggest possibilities for new techniques, it is important to move beyond point design and to introduce careful scientific measurement of human behavioral principles. In particula ...

Keywords: bimanual asymmetry, haptic input, input devices, three-dimensional interaction, two-handed interaction, virtual manipulation

5 Intuitive and Interactive Modification of Large Finite Element Models

Dirc Rose, Katrin Bidmon, Thomas Ertl
October 2004 **Proceedings of the conference on Visualization '04**
Publisher: IEEE Computer Society
Full text available: pdf(463.06 KB) Additional Information: full citation, abstract

Virtual prototyping is increasingly replacing real mock-ups and experiments in industrial product development. Part of this process is the simulation of structural and functional properties, which is in many cases based on Finite Element Analysis (FEA). One prominent example from the automotive industry is the safety improvement resulting from crash worthiness simulations. A simulation model for this purpose usually consists of up to one million finite elements and is assembled from many parts w ...

Keywords: finite element modeling, interaction, manipulators, autostereoscopy

6 Posters: Tangible user interfaces for 3D clipping plane interaction with volumetric data: a case study

Wen Qi, Jean-Bernard Martens
October 2005 **Proceedings of the 7th international conference on Multimodal interfaces ICMI '05**
Publisher: ACM Press
Full text available: pdf(919.91 KB) Additional Information: full citation, abstract, references, index terms

Visualization via direct volume rendering is a potentially very powerful technique for exploring and interacting with large amounts of scientific data. However, the available two-dimensional (2D) interfaces make three-dimensional (3D) manipulation with such data very difficult. Many usability problems during interaction in turn discourage the widespread use of volume rendering as a scientific tool. In this paper, we present a more in-depth investigation into one specific interface aspect, i.e., ...

Keywords: intersection, tangible interface, volume visualization, volumetric data

7 The metaDESK: models and prototypes for tangible user interfaces

Brygg Ullmer, Hiroshi Ishii
October 1997 **Proceedings of the 10th annual ACM symposium on User interface software and technology**
Publisher: ACM Press
Full text available: pdf(1.51 MB) Additional Information: full citation, references, citings, index terms

Keywords: augmented reality, haptic input, input devices, tangible user interfaces, ubiquitous computing

8 Toolspaces and glances: storing, accessing, and retrieving objects in 3D desktop applications

Jeffrey S. Pierce, Matthew Conway, Maarten van Dantzich, George Robertson
April 1999 **Proceedings of the 1999 symposium on Interactive 3D graphics**
Publisher: ACM Press
Full text available: pdf(587.47 KB) Additional Information: full citation, references, citings, index terms

Keywords: 3D graphics, desktop virtual reality, two handed interaction, virtual worlds

9 Modeling and manipulation: Real-time volume manipulation

V. Singh, D. Silver, N. Cornea

July 2003 **Proceedings of the 2003 Eurographics/IEEE TVCG Workshop on Volume graphics VG '03**

Publisher: ACM Press

Full text available: pdf(479.03 KB) Additional Information: full citation, abstract, references

In this paper, we describe a set of algorithms and an implementation (called VolEdit), for interactively manipulating 3D volumetric objects (datasets). The system utilizes skeletons, which allows users/animators to interactively and intuitively specify the location and type of deformation desired. The skeleton is extracted automatically from the volumetric model and indexes the appropriate part of the volume that needs to be transformed by defining piecewise bounds of the volume. The deformed vo ...

Keywords: animation, bounding boxes, deformation, manipulation, mid-plane geometry, skeleton, texture mapping

10 Sketching in 3D

Robert Zeleznik

November 1998 **ACM SIGGRAPH Computer Graphics**, Volume 32 Issue 4

Publisher: ACM Press

Full text available: pdf(488.44 KB) Additional Information: full citation, abstract, index terms

Of the numerous changes to the implements for creating 2D images and 3D models, one of the most radical has been the recent adoption of WIMP interfaces. Ironically, there is good reason to believe that WIMP interaction for 3D modeling is actually inferior to the real-world interfaces (pencils, large sheets of paper, clay, paint palettes) that it supplants. In fact, WIMP interaction's principal benefit is its straightforward integration with computer 3D model representations which have many advan ...

11 Interaction, creativity and communication: PHOXEL-SPACE: an interface for exploring volumetric data with physical voxels

Carlo Ratti, Yao Wang, Ben Piper, Hiroshi Ishii, Assaf Biderman

August 2004 **Proceedings of the 2004 conference on Designing interactive systems: processes, practices, methods, and techniques**

Publisher: ACM Press

Full text available: pdf(712.22 KB) Additional Information: full citation, abstract, references, index terms

Three-dimensional datasets (voxel datasets), generated by different types of sensing or computer simulations, are quickly becoming crucial to various disciplines - from biomedicine to geophysics. Phoxel-Space is an interface that enables the exploration of these datasets through physical materials. It aims at overcoming the limitations of traditional planar displays by allowing users to intuitively navigate and understand complex 3-dimensional datasets. The system works by allowing the user to m ...

Keywords: 3D laser scanner, anatomy, archeology, augmented reality, biomedicine, computational fluid dynamics (CFD), earth and atmospheric sciences, geophysics, input design and strategies, medical information systems, spatial understanding, tangible user interface, virtual reality, voxel

12 Hands-On Interfaces: Illuminating clay: a 3-D tangible interface for landscape analysis

Ben Piper, Carlo Ratti, Hiroshi Ishii

April 2002 **Proceedings of the SIGCHI conference on Human factors in computing systems: Changing our world, changing ourselves**

Publisher: ACM Press

Full text available: pdf(1.50 MB) Additional Information: full citation, abstract, references, citings, index terms

This paper describes a novel system for the real-time computational analysis of landscape models. Users of the system - called Illuminating Clay - alter the topography of a clay landscape model while the changing geometry is captured in real-time by a ceiling-mounted laser scanner. A depth image of the model serves as an input to a library of landscape analysis functions. The results of this analysis are projected back into the workspace and registered with the surfaces of the model.We describe ...

Keywords: 3D laser scanner, DEM, GIS, landscape design, physical models, tangible user interface

13 Computing curricula 2001

September 2001 **Journal on Educational Resources in Computing (JERIC)**
Publisher: ACM Press
Full text available: pdf(613.63 KB) html(2.78 KB) Additional Information: full citation, references, citings, index terms

14 Bricks: laying the foundations for graspable user interfaces

George W. Fitzmaurice, Hiroshi Ishii, William A. S. Buxton
May 1995 **Proceedings of the SIGCHI conference on Human factors in computing systems**
Publisher: ACM Press/Addison-Wesley Publishing Co.
Full text available: html(44.57 KB) Additional Information: full citation, references, citings, index terms

15 Immersive VR decision training: telling interactive stories featuring advanced virtual human simulation technologies

Michal Ponder, Bruno Herbelin, Tom Molet, Sebastien Schertenlieb, Branislav Ulicny, George Papagiannakis, Nadia Magnenat-Thalmann, Daniel Thalmann
May 2003 **Proceedings of the workshop on Virtual environments 2003 EGVE '03**
Publisher: ACM Press
Full text available: pdf(3.82 MB) Additional Information: full citation, abstract, references, citings, index terms

Based on the premise of a synergy between the interactive storytelling and VR training simulation this paper treats the main issues involved in practical realization of an immersive VR decision training system supporting possibly broad spectrum of scenarios featuring interactive virtual humans. The paper describes a concrete concept of such a system and its practical realization example.

Keywords: decision training, immersive VR, interactive storytelling, virtual human simulation

16 Production: Building Virtual and Augmented Reality museum exhibitions

Rafal Wojciechowski, Krzysztof Walczak, Martin White, Wojciech Cellary
April 2004 **Proceedings of the ninth international conference on 3D Web technology**
Publisher: ACM Press
Full text available: pdf(5.89 MB) Additional Information: full citation, abstract, references, index terms

A system that allows museums to build and manage Virtual and Augmented Reality exhibitions based on 3D models of artifacts is presented. Dynamic content creation based on pre-designed visualization templates allows content designers to create virtual exhibitions very efficiently. Virtual Reality exhibitions can be presented both inside museums, e.g. on touch-screen displays installed inside galleries and, at the same time, on the Internet. Additionally, the presentation based on Augmented Realit ...

Keywords: VRML, augmented reality, cultural heritage, virtual reality

17 Tangible products: redressing the balance between appearance and action

Tom Djajadiningrat, Stephan Wensveen, Joep Frens, Kees Overbeeke

September 2004 **Personal and Ubiquitous Computing**, Volume 8 Issue 5

Publisher: Springer-Verlag

Full text available: pdf(1.22 MB) Additional Information: full citation, abstract, index terms

Over the past decade, our group has approached interaction design from an industrial design point of view. In doing so, we focus on a branch of design called "formgiving"Whilst formgiving is somewhat of a neologism in English, many other European languages do have a separate word for form-related design, including German (Gestaltung), Danish (formgivnin), Swedish (formgivning) and Dutch (vormgeving).Traditionally, formgiving has been concerned with such aspects of objects as form, co ...

Keywords: Ecological psychology, Industrial design, Semantics, Tangible interaction

18 ViSTA FlowLib - framework for interactive visualization and exploration of unsteady flows in virtual environments

M. Schirski, A. Gerndt, T. van Reimersdahl, T. Kuhlen, P. Adomeit, O. Lang, S. Pischinger, C. Bischof

May 2003 **Proceedings of the workshop on Virtual environments 2003 EGVE '03**

Publisher: ACM Press

Full text available: pdf(866.39 KB) Additional Information: full citation, abstract, references, citings, index terms

In the past a lot of work has been invested in various aspects of an interactive visualization of CFD simulation data. This includes e.g. increasing the rendering speed and responsiveness of complex visualizations, using and enhancing multimodal user interfaces, and incorporating parallel approaches for an ef cient extraction of ow properties and their respective visual representation. Still, only few projects combine the signi cant advances in these areas. In this paper, we describe our softwar ...

19 Touch-sensing input devices

Ken Hinckley, Mike Sinclair

May 1999 **Proceedings of the SIGCHI conference on Human factors in computing systems: the CHI is the limit**

Publisher: ACM Press

Full text available: pdf(1.23 MB) Additional Information: full citation, abstract, references, citings, index terms

We can touch things, and our senses tell us when our hands are touching something. But most computer input devices cannot detect when the user touches or releases the device or some portion of the device. Thus, adding touch sensors to input devices offers many possibilities for novel interaction techniques. We demonstrate the TouchTrackball and the Scrolling TouchMouse, which use unobtrusive capacitance sensors to detect contact from the users hand without requiring pressure or mechan ...

Keywords: haptic input, input devices, interaction techniques, sensor technologies, tactile input, touch-sensing devices

20 Smart interaction techniques 1: Snap-and-go: helping users align objects without the modality of traditional snapping

Patrick Baudisch, Edward Cutrell, Ken Hinckley, Adam Eversole

April 2005 **Proceedings of the SIGCHI conference on Human factors in computing systems**

Publisher: ACM Press

Full text available: pdf(553.98 KB) Additional Information: full citation, abstract, references, index terms

Snapping is a widely used technique that helps users position graphical objects precisely, e.g., to align them with a grid or other graphical objects. Unfortunately, whenever users want to position a dragged object *close* to such an aligned location, they first need to deactivate snapping. We propose *snap-and-go*, a snapping technique that overcomes this

limitation. By merely stopping dragged objects at aligned positions, rather than "warping" them there, snap-and-go helps users alig ...

Keywords: alignment, mouse input, pseudo haptics, snap-dragging, snapping

Terms used
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Timothy Miller, Robert Zeleznik

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Keywords: haptic input, input devices, interaction techniques, sensor technologies, tactile input, touch-sensing devices

11 VisionWand: interaction techniques for large displays using a passive wand tracked in 3D

Xiang Cao, Ravin Balakrishnan

November 2003 **Proceedings of the 16th annual ACM symposium on User interface software and technology**

Publisher: ACM Press

Full text available: pdf(3.36 MB) mov(3:20 MIN) wmv(3:20 MIN) Additional Information: full citation, abstract, references, citings, index terms

A passive wand tracked in 3D using computer vision techniques is explored as a new input mechanism for interacting with large displays. We demonstrate a variety of interaction techniques that exploit the affordances of the wand, resulting in an effective interface for large scale interaction. The lack of any buttons or other electronics on the wand presents a challenge that we address by developing a set of postures and gestures to track state and enable command input. We also describe the use o ...

Keywords: buttonless input, gestures, input devices, interaction techniques, large displays, vision tracking

12 Putting the feel in 'look and feel'

Ian Oakley, Marilyn Rose McGee, Stephen Brewster, Philip Gray

April 2000 **Proceedings of the SIGCHI conference on Human factors in computing systems**

Publisher: ACM Press

Full text available: pdf(932.81 KB) Additional Information: full citation, abstract, references, citings, index terms

Haptic devices are now commercially available and thus touch has become a potentially realistic solution to a variety of interaction design challenges. We report on an investigation of the use of touch as a way of reducing visual overload in the conventional desktop. In a two-phase study, we investigated the use of the PHANToM haptic device as a means of interacting with a conventional graphical user interface. The first experiment

compared the effects of four different haptic augmentations o ...

Keywords: force feedback, haptics, multimodal interaction

13 An exploration into supporting artwork orientation in the user interface

George W. Fitzmaurice, Ravin Balakrishnan, Gordon Kurtenbach, Bill Buxton

May 1999 **Proceedings of the SIGCHI conference on Human factors in computing systems: the CHI is the limit**

Publisher: ACM Press

Full text available: pdf(1.50 MB) Additional Information: full citation, abstract, references, citings, index terms

Rotating a piece of paper while drawing is an integral and almost subconscious part of drawing with pencil and paper. In a similar manner, the advent of lightweight pen-based computers allow digital artwork to be rotated while drawing by rotating the entire computer. Given this type of manipulation we explore the implications for the user interface to support artwork orientation. First we describe an exploratory study to further motivate our work and characterize how artwork is manipu ...

Keywords: GUI toolkits, LCDs, RUI, pen-based computers, rotating user interfaces, tablets, two-handed input

14 Coincident display using haptics and holographic video

Wendy Plesniak, Ravikanth Pappu

January 1998 **Proceedings of the SIGCHI conference on Human factors in computing systems**

Publisher: ACM Press/Addison-Wesley Publishing Co.

Full text available: pdf(1.12 MB) Additional Information: full citation, references, citings, index terms

Keywords: autostereoscopic display, coincident display, electro-holography, haptics, holography, offset display

15 A widget framework for augmented interaction in SCAPE

Leonard D. Brown, Hong Hua, Chunyu Gao

November 2003 **Proceedings of the 16th annual ACM symposium on User interface software and technology**

Publisher: ACM Press

Full text available: pdf(8.29 MB) mov(6:51 MIN) wmv(6:51 MIN) Additional Information: full citation, abstract, references, citings, index terms

We have previously developed a collaborative infrastructure called SCAPE - an acronym for Stereoscopic Collaboration in Augmented and Projective Environments - that integrates the traditionally separate paradigms of virtual and augmented reality. In this paper, we extend SCAPE by formalizing its underlying mathematical framework and detailing three augmented Widgets constructed via this framework: CoCylinder, Magnifier, and CoCube. These devices promote intuitive ways of selecting, examining, an ...

Keywords: augmented reality (AR), head-mounted display (HMD), head-mounted projective display (HMPD), human computer Interaction (HCI), tangible user interface (TUI), virtual reality (VR)

16 Overview of augmented reality

Ronald Azuma

August 2004 **Proceedings of the conference on SIGGRAPH 2004 course notes GRAPH '04**

Publisher: ACM Press

Full text available: pdf(6.12 MB) Additional Information: full citation

17 Interaction: Towards intuitive exploration tools for data visualization in VR

Gerwin de Haan, Michal Koutek, Frits H. Post

November 2002 **Proceedings of the ACM symposium on Virtual reality software and technology**

Publisher: ACM Press

Full text available: pdf(5.40 MB) Additional Information: full citation, abstract, references, index terms

In this paper we present a basic set of intuitive exploration tools for the data visualization in a Virtual Environment on the Responsive Workbench. First, we introduce the Plexipad, a transparent acrylic panel which allows two-handed interaction in combination with a stylus. After a description of various interaction scenarios with these two devices, we present a basic set of interaction tools, which support the user in the process of exploring volumetric datasets. Besides the interaction tools ...

Keywords: data exploration, two-handed interaction, user interface, virtual reality, visualization

18 Interaction in the real world: Ambient touch: designing tactile interfaces for handheld devices

Ivan Poupyrev, Shigeaki Maruyama, Jun Rekimoto

October 2002 **Proceedings of the 15th annual ACM symposium on User interface software and technology**

Publisher: ACM Press

Full text available: pdf(3.71 MB) Additional Information: full citation, abstract, references, citings, index terms

This paper investigates the sense of touch as a channel for communicating with miniature handheld devices. We embedded a PDA with a TouchEngine™ --- a thin, miniature lower-power tactile actuator that we have designed specifically to use in mobile interfaces (Figure 1). Unlike previous tactile actuators, the TouchEngine is a universal tactile display that can produce a wide variety of tactile feelings from simple clicks to complex vibrotactile patterns. Using the TouchEngine, we bega ...

Keywords: mobile devices and interfaces, tactile feedback

19 DataTiles: a modular platform for mixed physical and graphical interactions

Jun Rekimoto, Brygg Ullmer, Haruo Oba

March 2001 **Proceedings of the SIGCHI conference on Human factors in computing systems**

Publisher: ACM Press

Full text available: pdf(931.24 KB) Additional Information: full citation, abstract, references, citings, index terms

The DataTiles system integrates the benefits of two major interaction paradigms: graphical and physical user interfaces. Tagged transparent tiles are used as modular construction units. These tiles are augmented by dynamic graphical information when they are placed on a sensor-enhanced flat panel display. They can be used independently or can be combined into more complex configurations, similar to the way language can express complex concepts through a sequence of simple words. In this ...

Keywords: graphical user interfaces, interaction techniques, radio-frequency identification tags, tangible user interfaces, visual language

20 Collaboration in a Virtual World: Support for Conceptual Learning?

Paul Brna, Rob Aspin

December 1998 **Education and Information Technologies**, Volume 3 Issue 3-4

Publisher: Kluwer Academic Publishers

Full text available: Publisher Site Additional Information: full citation, abstract, citings

Immersive and semi‐immersive Virtual Reality (VR) systems have been used for training in the execution of procedures, in exploring (often static) 3D structures such as architectural designs or geographical features, and in designing buildings or constructing molecules. In a separate line of technological development, the availability of distributed computing capabilities has led to VR systems that provide facilities for groups of students that are geographically separated to learn toge ...

Keywords: Human‐Computer Interface (HCI), collaborative learning